

EXECUTIVE SUMMARY

The goals of the study were to characterize the food web for larval striped bass and other young finfish species in the lower Roanoke River and western Albemarle Sound, North Carolina, and to ascertain if food chain interruption may be a factor contributing to poor recruitment. Striped bass recruitment to the year class forming in the nursery grounds of western Albemarle Sound has been poor relative to the numbers of eggs spawned by adult fish in the Roanoke River each year. Therefore, abnormally high mortality is occurring between egg hatch and juvenile recruitment. An inadequate food supply would result in starvation of the larvae. An inadequate supply can be the result of low numbers of prey items, inaccessibility to prey by fish larvae due to prey size or quickness, or both factors. If striped bass larvae in the Roanoke-Albemarle system are food limited, then an examination of co-habiting young finfish species should indicate whether the food limitation is quantity, quality, or both. Those species that have diet overlap with striped bass may show greater success at feeding on preferred prey of striped bass, suggesting that striped bass are outcompeted for food resources. On the other hand, those same finfish species may show a poor feeding rate, similar to striped bass, suggesting that young finfish in the system are food limited by quantity of prey. We combined data sets on water quality, primary productivity, zooplankton, larval abundance, and larval food habits collected in the springs of 1982-1986 and 1988 to provide information spanning six years of varying seasonal and river flow patterns. The year 1987 was a flood year in which too few striped bass larvae were collected to perform food habit analyses. Collection sites were the lower Roanoke River, delta (Thoroughfare, Cashie, Middle, Eastmost, and Roanoke rivers), Batchelor Bay, and western Albemarle Sound.

River Flow. Regulation of instream flow by the last three dams in the watershed (Kerr, Gaston, and Roanoke Rapids), combined with annual variability in rainfall, resulted in river discharge patterns for all study years atypical of the historical pattern. The historical seasonal pattern of river flow is one in which spring rains result in higher river discharge in March and April, followed by moderation in May and lower flows in June. Flood years were 1983, 1984 and 1987; highest flows were in April through mid-May. Spring 1982 river flows were lowest in April and continued to increase through May with peak discharge during mid- through late June. Drought years were 1985 and 1986; in both years instream flows were increased briefly by reservoir releases to the minimums required for striped bass spawning. Spring 1988 river flows were regulated by the U.S. Army Corps of Engineers and Virginia Power using instream flow guidelines under development at the time by the Roanoke River Water Flow Committee.

Water Quality. Spring water temperature patterns changed each year as a function of the seasonality of prevailing air temperature, weather fronts, and instream flow regulated primarily by discharge of reservoir waters. In general, water temperatures were higher in Batchelor Bay and western Albemarle Sound than in the lower Roanoke River and delta at the same time. Dissolved oxygen values in the study area were above 4 mg/L every spring, with notable exceptions during high flow periods in 1987. Surface water pH values were acidic much of the time in 1986, with an observed low of 6.0 in late May. Acidic conditions also were